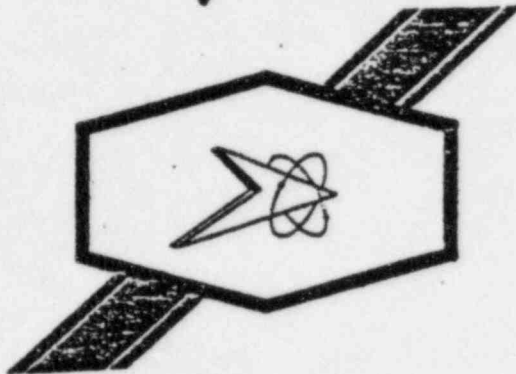


Imperial



TECHNICAL REPORT

NUMBER

175-1-77

TITLE

DEA, RADIATION TOLERANCE OF NUTEC #11S/11/1201

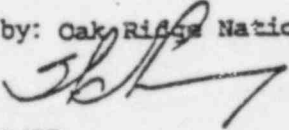
Over Sandblasted Concrete

FOR

SICC

CUSTOMER

Submitted by: Oak Ridge National Labs

Approved: 

Date: 12/77

SOUTHERN IMPERIAL COATINGS CORPORATION, INC.
P. O. Box 29077, • New Orleans, Louisiana 70189
Phone: (504) 254-1433

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8511060053 851016

PDR FOIA
GARDEB5-59

PDR

Report of Irradiation and DBA Testing
Southern Imperial, New Orleans, Louisiana

The Irradiation and Design Basis Accident (DBA) tests are conducted, respectively, in accordance with Bechtel Corporation Standard Specification Coatings for Nuclear Power Plants, Spec. Nos. CP-951 and CP-956. The tests are designed also to meet the specifications set in both A.N.S.I. Report N 101.2-1972, Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities, and N 5.12-1974, Protective Coatings (Paints) for the Nuclear Industry. The DBA test spray solution and the test conditions are listed in Tables 1 and 2. After both the DBA and the irradiation tests, the coatings are examined for signs of chalking, blistering, cracking, peeling, delamination, and flaking, according to ASTM standards where applicable. All except the decontamination test panels are returned to the coating manufacturer.

The irradiation tests are run using a spent fuel assembly removed from the High Flux Isotope Reactor (HFIR) at ORNL, as the source of radiation. These fuel assemblies are stored under 20 feet of demineralized water. The fuel is 93% enriched U^{235} as U_3O_8 combined with aluminum. The spent fuel assemblies are removed after each 23-megawatt day period. Irradiation is done using the gamma energy from the accumulated mixed fission products. This more readily simulates conditions around a reactor than does a cobalt source. Also, the higher gamma activity affords shorter irradiation time to achieve accumulated doses. The dose rate four days after removal of a fuel assembly from the reactor is 1×10^8 rads/hour.

The fuel assembly is 20 inches high. A 20-foot long, 3 1/2-inch diameter pipe, with one end capped, is used for the air irradiation tests. The capped end is lowered into the four-inch opening of the center of the fuel assembly. The open end, above the water level, is covered with an "O" ring sealed flange to which is attached a steel cable and an air outlet hose. The air inlet is located at the bottom of the pipe. The test specimens are connected to the bottom of the cable and lowered into the radiation field. Also at the center of the fuel assembly is a stainless steel clad cadmium tube used as a neutron absorber. This prevents contamination of the test specimens by induced radiation.

Evaluated

J. G. G. G.

Approved

L. T. G. G.

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC #11S/NUTEC #11/REACTIC #1201
2. TYPE SUBSTRATE: Concrete - Bechtel CP-956 SIZE: 2" x 4" x 2"
3. SURFACE PREPARATION (Describe): All Concrete surfaces sandswept with Cresblast #4
Blasting Sand to expose all rock pockets and voids.
4. PRODUCT DATA: SAMPLE NO.(s): 2373
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: None

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	NUTEC	11S	1310/1556/1312	Squeegee	76°/59%	*	4/4/77
			Base/Cure/Fill				
2	NUTEC	11	1313/1314	Squeegee	74°/58%	*	4/6/77
			Base/Cure				
3	REACTIC	1201	7497/7434	Spray	82°/48%	*	4/11/77
			Base/Cure				

		NUTEC #11S	NUTEC	REACTIC #1201
* Minimum Thickness	Broomed Surface	.010-.015in	.003-.005 in	.003-.005 in
Average Thickness	Sides Adjacent to Broomed Surface	.015-.020in	.005-.010 in	.007-.008 in.
Maximum Thickness	Sides Opposite Broomed Surface	.025-.035in	.015-.020 in.	.010-.012 in.

Total Dry Film Thickness Range -.016 to .067 inches.

6. CURING CONDITIONS: AMBIENT TEMP. 70-80 °F REL. HUMIDITY 40-65
MINIMUM CURE 11 DAYS

7. TEST PROCEDURE: DBA - Bechtel CP-956

8. TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 4/22/77

APPROVED: 

TEST REPORT NO. 175-1-77

DATE: 12/77

PREPARED BY: Freddie E. Arnold

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC #11S/NUTEC #11/REACTIC #1201
2. TYPE SUBSTRATE: Concrete - Bechtel CP-956 SIZE: 2" x 4" x 2"
3. SURFACE PREPARATION (Describe): All concrete surfaces sandswept with Cresblast #4
Blasting Sand to expose all rock pockets and voids.
4. PRODUCT DATA: SAMPLE NO.(s): 2374
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: None

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	NUTEC	11S	1310/1556/1312 Base/Cure/Fill	Squeegee	76°/59%	*	4/4/77
2	NUTEC	11	1313/1314 Base/Cure	Squeegee	74°/58%	*	4/6/77
3	REACTIC	1201	7497/7434 Base/Cure	Spray	82°/48%	*	4/11/77

		NUTEC #11S	NUTEC #11	REACTIC #1201
Maximum Thickness	Broomed Surface	.025-.035 in.	.015-.020 in.	.010 - .012 in.
Average Thickness	Sides Adjacent to Broomed Surface	.015-.020 in.	.005-.010 in.	.007-.008 in.
Minimum Thickness	Sides Opposite Broomed Surface	.010-.015 in.	.003-.005 in.	.003-.005 in.

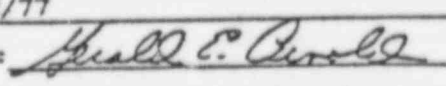
Total Dry Film Thickness Range - .016 to .067 inches.

6. CURING CONDITIONS: AMBIENT TEMP. 70-80 °F REL. HUMIDITY 40-65
MINIMUM CURE 11 DAYS
7. TEST PROCEDURE: DBA - Bechtel CP-956
8. TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 4/22/77

APPROVED: 

TEST REPORT NO. 175-1-77

DATE: 12/77

PREPARED BY: 

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA


1. PRODUCT TO BE TESTED: NUTEC #11S/NUTEC #11/REACTIC #1201
2. TYPE SUBSTRATE: Concrete - Bechtel CP-956 SIZE: 2" x 4" x 2"
3. SURFACE PREPARATION (Describe): All Concrete surfaces sandswept with Cresblast #4 blasting sand to expose all rock pockets and voids.
4. PRODUCT DATA: SAMPLE NO.(s): 2375
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: None

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	NUTEC	11S	1310/1556/1312 Base/Cure/Fill	Squeegee	76°/59%	*	4/4/77
2	NUTEC	11	1313/1314 Base/Cure	Squeegee	74°/58%	*	4/6/77
3	REACTIC	1201	7497/7434 Base/Cure	Spray	82°/48%	*	4/11/77

		NUTEC 11S	NUTEC 11	REACTIC 1201
Maximum Thickness	Broomed Surface	.025-.035	.015-.020	.010-.012
Average Thickness	Sides Adjacent to Broomed Surface	.015-.020	.005-.010	.007-.008
Minimum Thickness	Side Opposite Broomed Surface	.010-.015	.003-.005	.003-.005

Total Dry film thickness range - .016 to .067 inches

6. CURING CONDITIONS: AMBIENT TEMP. 70-80 °F REL. HUMIDITY 40-65 ..
MINIMUM CURE 11 DAYS
7. TEST PROCEDURE: DBA Bechtel CP-956
8. TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 4/22/77

APPROVED: 

TEST REPORT NO. 175-1-77

DATE: 12/77

PREPARED BY: Gerald E. Arnold

DI AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC #11S/NUTEC #11/REACTIC #1201
2. TYPE SUBSTRATE: Concrete - Bechtel CP-956 SIZE: 2" x 4" x 2"
3. SURFACE PREPARATION (Describe): All concrete surfaces sandswept with Cressblast #4
Blasting sand to expose all rock pockets and voids.
4. PRODUCT DATA: SAMPLE NO.(s): 2376
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: None

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	NUTEC	11S	1310/1556/1312	Squeegee	76°/59%	*	4/4/77
			Base/Cure/Fill				
2	NUTEC	11	1313/1314	Squeegee	74°/58%	*	4/6/77
			Base/Cure				
	REACTIC	1201	7497/7434	Spray	82°/48%	*	4/11/77
			Base/Cure				

		NUTEC #11S	NUTEC #11	REACTIC #1201
Minimum Thickness	Broomed Surface	.010-.015 in.	.003-.005 in.	.003-.005 in.
Average Thickness	Sides Adjacent to Broomed Surface	.015-.020 in.	.005-.010 in.	.007-.008 in.
Maximum Thickness	Sides Opposite Broomed Surface	.025-.035 in.	.015-.020 in.	.010-.012 in.

Total Dry Film Thickness-Range - .016 to .067 inches.

6. CURING CONDITIONS: AMBIENT TEMP. 70-80 °F REL. HUMIDITY 40-65
MINIMUM CURE 11 DAYS

7. TEST PROCEDURE: DBA - Bechtel CP-956

8. TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 4/22/77

APPROVED: [Signature]

TEST REPORT NO. 175-1-77

DATE: 12/77

PREPARED BY: [Signature]

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 5-31-77

115/11/1201

ORNL Master Analytical Manual Method No. 2 0922;
Bechtel Corp. Spec. No. CP-956;
ORNL Log Book No. A 7562; 4-29-7

[illegible]

*Irradiated.

** (SA) = sand blast; (SH) = shot blast; (GR) = grit blast.

Evaluated

Approved

Manufacturer: Southern Imperial
New Orleans, LA

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 5-31-77

System Identification: Steel Panel ☒ Concrete Block

11S/11/1201

Radiation Tolerance Test Results:

ORNL Master Analytical Manual Method No. 2 0921;
Bechtel Corp. Spec. No. CP-951;
ORNL Log Book No. A 7562; 4-29-7

Initial Dose Rate: 1.55-1.8 x 10⁷ rads/hr

Test Conducted In: ☒ air ☐ water

Cumulative Dose Rate: Comments

Sample No.

1 x 10⁸ rads

1 x 10⁷ rads

2373

Coatings intact; no defects.

2374

Coatings intact; no defects.

Additional Comments:

Evaluated

Approved

J. G. Gellberg
L. T. Gellberg

Manufacturer: Southern Imperial
New Orleans, LA

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 5-31-77

Table 1. DBA Solution Composition, Distilled Water.

0.28 M boric acid (3,000 ppm boron)
0.064 M sodium thiosulfate
Adjusted to pH 9.5 with sodium hydroxide

Table 2. DBA Test Conditions.

Time	Temperature (°F)	Pressure (psig)	Comments
Start	170	-	Autoclave preheated.
20 seconds	340	70 (10 sec)	Steam injected.
6 hours	340	70	Pressure maintained by relief valve.
20 seconds	220	30	Spray solution added at 75°F.
20 minutes	220-250	30	
4 days	250	30	
20 seconds	170	-15	Fresh spray solution added at 75°F after draining autoclave.
25 minutes	170-200	10	
3 days	200	10	
End of test			

ORNL Log Book No. A7562; 4-29-7.

Evaluated

Approved

G. J. Quigley
L. T. Baker

PROTECTIVE COATING QUALIFICATION CONDITIONS
INSIDE CONTAINMENT

BWR/PWR CONTAINMENT TEMPERATURE

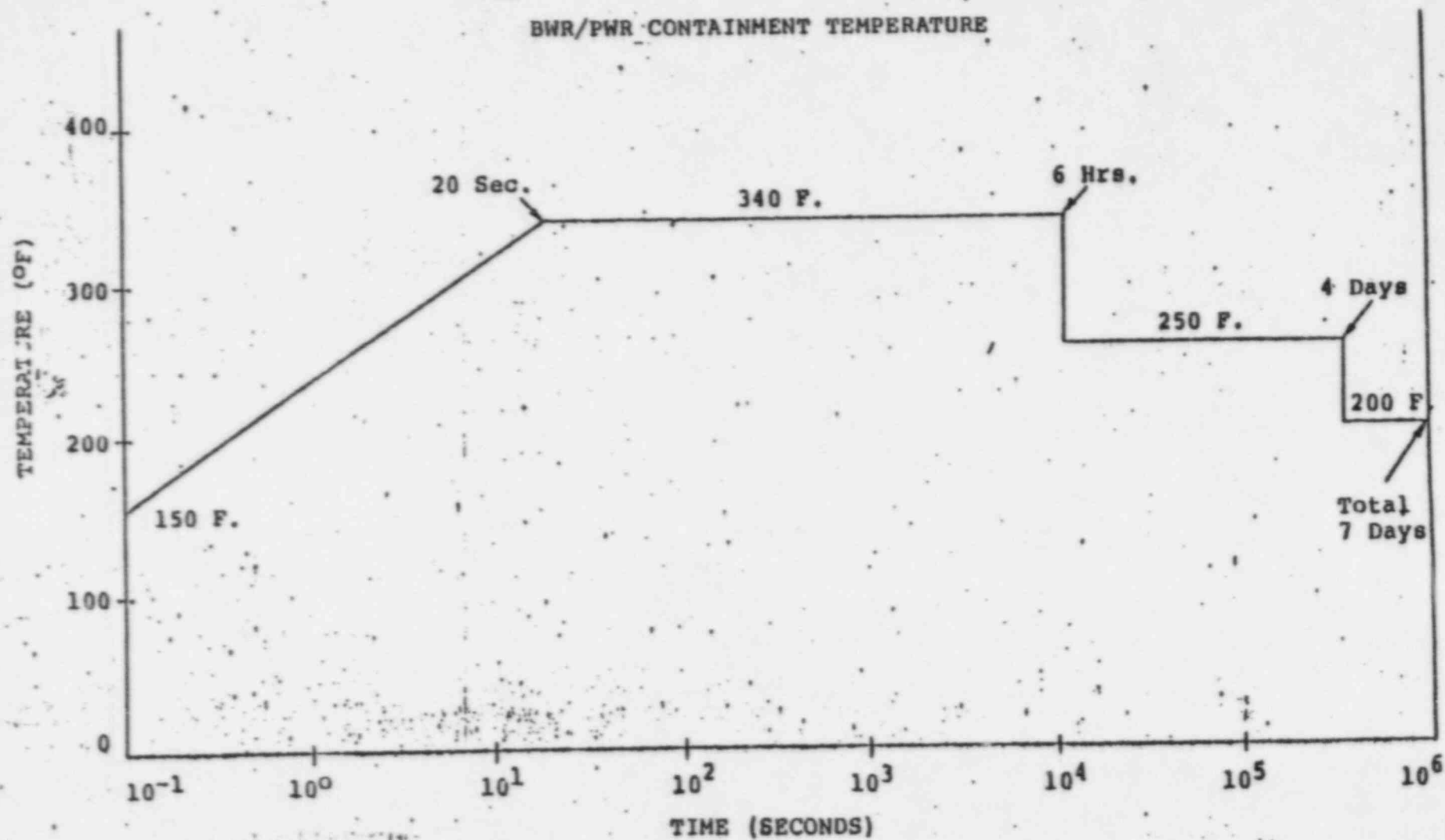


Table 1

PROTECTIVE COATING QUALIFICATION CONDITIONS
INSIDE CONTAINMENT

BWR/PWR CONTAINMENT PRESSURE

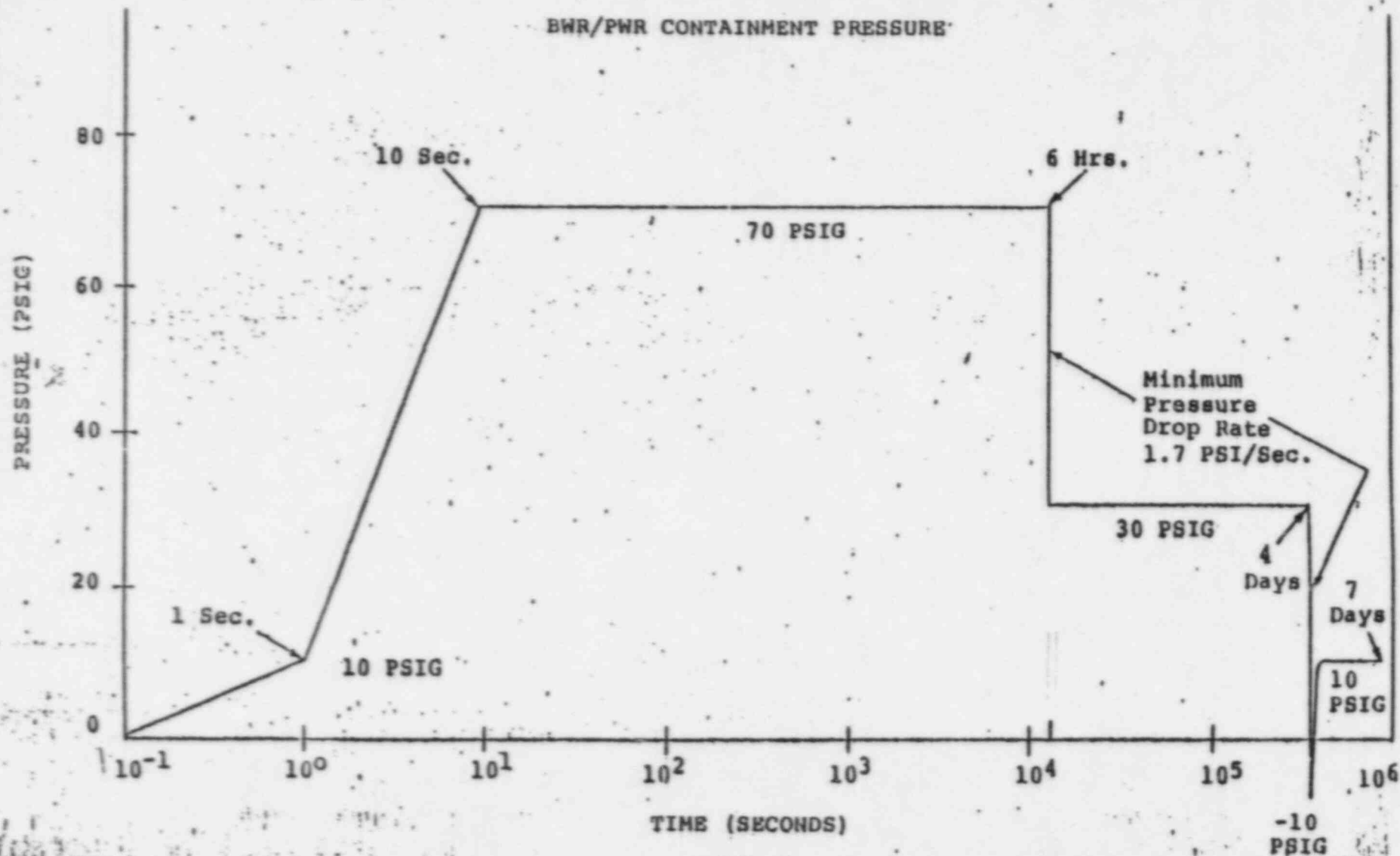
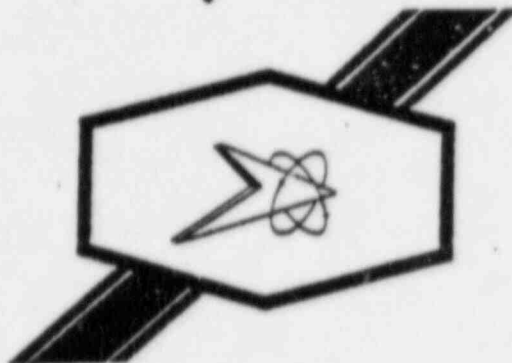


Table 2

REFERENCE: Lab. Notebook #33, p.111

Imperial



TECHNICAL REPORT

NUMBER

549-81

TITLE

RADIATION TOLERANCE/DBA RESULTS
11S/11/1201/1201
HIGH FILM THICKNESSES OF NUTEC 1201 TOPCOAT
FOR
GENERAL USE

CUSTOMER

Submitted by: Gerald E. Arnold *GA*

Approved: Robert R. Taylor *RRT* 2/2/82

Date: December 9, 1981

SOUTHERN IMPERIAL COATINGS CORPORATION, INC.
P. O. Box 29077, * New Orleans, Louisiana 70189
Phone: (504) 254-1433

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8511050339

SCOPE:

The purpose of this test was to evaluate the performance of the Nutec concrete coating system with multicoats and high film thicknesses of Nutec 1201 topcoat.

BACKGROUND:

In many cases, additional coats of Nutec 1201 are applied to the original Nutec concrete coating system. Such instances are:

1. Film building to achieve designated minimum thickness requirements;
2. Repair of pinholes;
3. Repair of damaged areas, with resultant overlap;
4. Overlapping adjacent previously coated areas;
5. Recoating for aesthetics (usually a fresh coat is applied to the system just prior to the contractor releasing the area to the client).

When the 11S/11/1201 system is recoated there is the potential for exceeding the specified maximum dry film thickness of 12 mils for Nutec 1201. This test was designed to evaluate the higher film thicknesses of 1201 both in a single coat application and in a two coat application.

SUMMARY:

Four specimens coated with 11S/11/1201/1201 were submitted to Oak Ridge National Laboratories for radiation tolerance testing at exposure levels of 3×10^8 and 1×10^9 rads, and design basis accident testing per the pressurized water reactor (PWR) parameters of 285°F and 48 PSI. Due to equipment malfunctions, the actual maximum temperature and pressure experienced was 340°F and 70 PSI respectively. The results comply with the acceptance criteria of ANSI N101.2 for DBA testing.

PROCEDURE:

Four concrete specimens were coated with the Nutec 11S/Nutec 11/Nutec 1201 system as described in the attached panel preparation sheets.

PROCEDURE (Con't):

Coupons A79 and A81 were first topcoated with the 11S/11/1201 system, weathered in an Atlas Weather-o-meter for 300 hours, used in an Elcometer adhesion test, repaired, and then re-topcoated with Nutec 1201.

All specimens were submitted to ORNL for irradiation at 3×10^8 and 1×10^9 rads and then design basis accident tested. The critical portion of the DBA test (first 28 hours) was performed in the autoclave; the remaining 10 days was conducted in a constant temperature and pressure chamber with 100% relative humidity.

RESULTS:

See attached ORNL results and result summary.

CONCLUSIONS:

The results comply with the requirements of ANSI N5.12 (radiation tolerance) and ANSI N101.2 (DBA), indicating that the higher film thickness of 1201 had no adverse effects on the performance of the Nutec system.

It should be noted that higher film thicknesses of 1201 may result in a slower evaporation rate (of solvent) and a correspondingly longer full cure time.

PANEL PREPARATION

SHEETS

TEST PANEL PREPARATION DATA

Part

1. PRODUCT TO BE TESTED: Nutec 11S/Nutec 11/Nutec 1201
2. TYPE SUBSTRATE: Concrete 2x4x2"
3. SURFACE PREPARATION (Describe): All faces given rough abrasive blast using G-50 steel grit
4. PRODUCT DATA: SAMPLE NO. (s): A282, A284

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F) %R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	11S	2782/2778/2526	Squeegee	85/71	.025-.045	6/16/81
2	Nutec	11S	2782/2778/2526	Squeegee	86/78	.020-.030	6/17/81
3	Nutec	11	2782/2778/2444	Squeegee	82/75	.004-.008	6/19/81
4	Nutec	1201	2067/2068	Spray	89/81	.008-.012	6/22/81
5	Nutec	1201	2067/2068	Spray	86/65	.008-.010	6/23/81

Side 1 .065-.105
 2 .065-.105
 3 .065-.105
 4 .065-.105

CURING CONDITIONS: AMBIENT TEMP. 65-95 °F REL. HUMIDITY 65-100 % MINIMUM CURE 7 DAYS
 TEST PROCEDURE: DBA
 TEST PERFORMED BY: ORNL DATE SUBMITTED: 9/25/81
 APPROVED BY: *Sheld C. Arnold* REPORT NUMBER: 549-81

TEST PANEL PREPARATION DATA

Page

1. PRODUCT TO BE TESTED: Nutec 11S/Nutec 11/Nutec 1201
2. TYPE SUBSTRATE: Concrete
3. SURFACE PREPARATION (Describe): Broomed surface blast swept to remove efflorescence, remaining surfaces wire brushed and blown with 100 psi compressed air.
4. PRODUCT DATA: SAMPLE NO. (s): A79

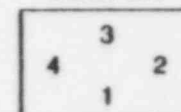
COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F) %R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	11S*	2519/2086/2516	Squeegee	71/73	See Below	3/27/81
2	Nutec	11*	2519/2086/2444	Squeegee	73/64	" "	4/02/81
3	Nutec	1201	2606/2607	Spray	71/54	" "	4/06/81
4	Nutec	1201 (1)	2067/2068	Spray	85/81	" "	7/10/81

Coupon stored until June 14, 1981 at which time coupon was placed in WOM for 300 hrs. exposure.

* Hand mixed

FILM THICKNESS (ins.)	11S	11	1201	1201 (1)	Total
Side 1	.025-.035	.005-.008	.006-.010		.036-.053
Side 2	.025-.035	-	.006-.010	.020-.030	.051-.075
Side 3	.025-.035	.005-.008	.006-.010	.015-.020	.051-.075
Side 4	.025-.035	.005-.008	.006-.010	.010-.015	.046-.068

TOP VIEW OF COUPON



Numbered and broomed surface

TOTAL DRY FIL THICKNESSES RANGE — Side 1. See above totals
Side 2.

Side 3. See above totals
Side 4.

CURING CONDITIONS: AMBIENT TEMP. 65-95 °F REL. HUMIDITY 65-100 % MINIMUM CURE 7 DAYS

TEST PROCEDURE: Adhesion, Weathering, Repair, Topcoatability, DBA

TEST PERFORMED BY: Imperial/Testing, ORNL

DATE SUBMITTED: 9/25/81

APPROVED BY: Harold E. Arnold

REPORT NUMBER: 549-81

TEST PANEL PREPARATION DATA

6

1. PRODUCT TO BE TESTED: Nutec 11S/Nutec 11/Nutec 1201
2. TYPE SUBSTRATE: Concrete
3. SURFACE PREPARATION (Describe): Broomed surface blast swept to remove efflorescence, remaining surfaces wire brushed and blown down with 100 psi compressed air.
4. PRODUCT DATA: SAMPLE NO. (s): A81

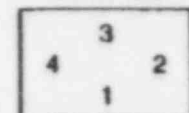
COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F) %R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	11S*	2519/2086/2516	Squeegee	71/73	See below	3/27/81
2	Nutec	11*	2519/2085/2444	Squeegee	73/64	" "	4/02/81
3	Nutec	1201	2606/2607	Spray	71/54	" "	4/06/81
4	Nutec	1201 (1)	2067/2068	Spray	85/81	" "	7/10/81

Coupon stored until June 14, 1981, at which time coupon was placed in WOM for 300 hrs. exposure.

* Drill mixed

FILM THICKNESS (ins.)	11S	11	1201	1201 (1)	Total
Side 1	.025-.035	.005-.008	.006-.010		.036-.053
Side 2	.025-.035	-	.006-.010	.020-.030	.051-.075
Side 3	.025-.035	.005-.008	.006-.010	.015-.020	.051-.075
Side 4	.025-.035	.005-.008	.006-.010	.010-.015	.046-.068

TOP VIEW OF COUPON



Numbered and broomed surface

TOTAL DRY FIL THICKNESSES RANGE — Side 1. See above totals Side 3. See above totals
Side 2. Side 4.

CURING CONDITIONS: AMBIENT TEMP. 65-95 °F REL. HUMIDITY 65-100 % MINIMUM CURE 7 DAYS

TEST PROCEDURE: Adhesion, Weathering, Repair, Topcoatability, DBA

TEST PERFORMED BY: Imperial/Testing CRNL DATE SUBMITTED: 9/25/81

APPROVED BY: Geralt E. Arnold REPORT NUMBER: 549-81

ORNL
PROCEDURES

Manufacturer: Imperial
New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: October 29, 1981

REPORT OF IRRADIATION AND DBA TESTING

The irradiation and design basis accident (DBA) tests are conducted, respectively, in accordance with Bechtel Corporation specifications CP-951 and CP-956 in Standard Specification Coatings for Nuclear Power Plants (or with modifications as noted in Table 2, DBA test conditions). The tests are designed to meet specifications set in both ANSI report N 101.2-1972, Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities, and N 5.12-1974, Protective Coatings (Paints) for the Nuclear Industry. The DBA test spray solution and the test conditions are listed in Tables 1 and 2. After both the DBA and irradiation tests, coatings are examined for signs of chalking, blistering, cracking, peeling, delamination, and flaking, according to ASTM standards where applicable. All test panels are returned to the coating manufacturer.

The irradiation tests are run using a spent fuel assembly, removed from the High-Flux Isotope Reactor at ORNL, as the source of radiation. These fuel assemblies are stored under 20 ft of demineralized water. The fuel is 93% enriched U-235 as U_3O_8 combined with aluminum. The spent fuel assemblies are removed after each 23-megawatt-day period. Irradiation is done using the gamma energy from accumulated mixed fission products. This more readily simulates conditions around a reactor than does a cobalt source. Also, the higher gamma activity affords shorter irradiation time to achieve accumulated doses. The dose rate four days after removal of a fuel assembly from the reactor is 1×10^6 rad/h.

The fuel assembly is 20 in. high. A 20-ft-long, 3-1/2-in.-diameter pipe, with one end capped, is used for air irradiation tests. The capped end is lowered into a 4-in. opening at the center of the fuel assembly. The open end, above water level, is covered with an O-ring-sealed flange to which is attached a steel cable and an air outlet hose. The air inlet is located at the bottom of the pipe. Test specimens are connected to the bottom of the cable and lowered into the radiation field. Also at the center of the fuel assembly is a stainless steel-clad cadmium tube used as a neutron absorber. This prevents contamination of the test specimens by induced radiation.

Evaluated Ray L. Kelly

Approved L. T. Cochran

Manufacturer: Imperial
New Orleans, Louisiana

Analytical Chemistry Division ^{Page 9}
Oak Ridge National Laboratory
Date: October 29, 1981

ORNL Log Book No. A9675, A10-8-1

Table 1. DBA solution composition, distilled water

Reagent	Concentration
Boric acid, H_3BO_3	2000 ppm
Sodium hydroxide, NaOH	Required to adjust pH to 9.5

Table 2. DBA test conditions

Time	Temperature (°F)	Pressure (psig)	Comments
Start	164	—	Autoclave preheated.
20 s	285	48	Solution added at 290°F.
1.5 min	340	70	*
1.5-5 min	285	48	Pressure maintained by relief valve.
5-7 min	285-267	48	Pressure adjusted with N_2 .
13 min	267	48	
13-53 min	267-220	48	Pressure adjusted with N_2 .
53-58 min	220-210	48-0	Pressure released at 0.15 psig/s.
58-167 min	210-150	0	
2.8-27.8 h	150-135	0	End of first part of test.
11 d	135	0	Specimens immersed in a constant-temperature bath.
End of test			

*Gas that evolved from the specimens upon addition of the hot chemical solution resulted in a pressure and subsequent temperature increase exceeding the specifications of the designed temperature-pressure curves.

Evaluated

Ralph L. Apple

Approved

L. T. Carlson

ORNL
RADIATION/DBA
RESULTS

RECEIVED

DATE 12/4/81
IMPERIAL NUCLEAR

OAK RIDGE NATIONAL LABORATORY

OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION



POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

December 1, 1981

Mr. Gerald E. Arnold
Technical Representative
Imperial Professional Coatings
P. O. Box 29077
New Orleans, Louisiana 70189

Dear Jerry:

Enclosed are combined reports describing test results recently obtained on Imperial protective coatings. Your attention is called to the temperature-pressure anomalies of A9675, A10-8-1.

If we can be of further assistance, please feel free to call on us.

Sincerely,

L. T. Corbin, Section Head
Analytical Chemistry Division

LTC:dmw

Enclosures

Manufacturer: Imperial
New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: October 29, 1981

SYSTEM IDENTIFICATION

 Steel panel x Concrete block

11S/11/1201/1201

RADIATION TOLERANCE TEST

ORNL Master Analytical Manual Method No. 2 0921; Bechtel Corporation
Specification No. CP-951; ORNL Log Book No. A9675, A10-2-1.

Initial dose rate: 0.9 x 10⁷ rad/h

Test conducted in: x air water

<u>Sample No.</u>	<u>Cumulative dose</u>	<u>Test results</u>
A79	3 x 10 ⁸ rad	Coatings intact, no defects all areas.
A81	1 x 10 ⁹ rad	Coatings intact, no defects all areas.

Evaluated

Ray L. Apple

Approved

L. T. Collins

Manufacturer: Imperial
New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: October 29, 1981

SYSTEM IDENTIFICATION

Steel panel x Concrete block

11S/11/1201/1201

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A9675, A10-8-1.

<u>Sample No.</u>	<u>DBA phase</u>	<u>Test results</u>
A79	spray*	Coatings intact, no defects after one day. Blisters, #4 few, sides B and C at end of test.
A81	spray*	Coatings intact, no defects after one day. Blisters, #4 few, sides B, C, and D at end of test.

*Irradiated.

Evaluated

Ray E. Apple

Approved

L. T. Cochran

Manufacturer: Imperial
New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: October 29, 1981

SYSTEM IDENTIFICATION

 Steel panel x Concrete block

11S/11/1201/1201

RADIATION TOLERANCE TEST

ORNL Master Analytical Manual Method No. 2 0921; Bechtel Corporation
Specification No. CP-951; ORNL Log Book No. A9675, A10-1-1.

Initial dose rate: 1.3 x 10⁷ rad/h

Test conducted in: x air water

<u>Sample No.</u>	<u>Cumulative dose</u>	<u>Test results</u>
A282	3 x 10 ⁸ rad	Coatings intact, no defects all areas.
A284	1 x 10 ⁹ rad	Coatings intact, no defects all areas.

Evaluated

Ralph L. Apple

Approved

L. F. Carlson

Manufacturer: Imperial
New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: October 29, 1981

SYSTEM IDENTIFICATION

Steel panel x Concrete block

115/11/1201/1201

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A9675, A10-8-1.

<u>Sample No.</u>	<u>DBA phase</u>	<u>Test results</u>
A282	spray*	Coatings intact, no defects after one day. Blisters, #4 few, sides A and B at end of test. No other defects.
A284	spray*	Coatings intact, no defects after one day. Single blister, #4, sides A and B at end of test. No other defects.

*Irradiated.

Evaluated

Ray L. Riple

Approved

L. T. Galt

SUMMARY OF RESULTS

Panel No.	DRY FILM THICKNESSES (In Mils)					DBA RESULTS	
	Maximum Single Coat 11S	Maximum Total 11S	Maximum 11	Maximum Single Coat 1201	Maximum Total 1201	After Day 1	After Day 11
A79	35	35	8	30	40	No Defect	#4 few Sides 2 & 3 N/D Side 1 & 4
A81	35	35	8	20	40	No Defect	#4 few Sides 2,3,4 N/D Side 1
A282	45	75	8	12	22	No Defect	#4 few Sides 1,2 N/D Side 3 & 4
A284	45	75	8	12	22	No Defect	One #4 on Side 1, 2 N/D Side 3 & 4

Panel No.	Radiation Exposure	Results
A79	3×10^8 rads	No Defects
A81	1×10^9 rads	No Defects
A282	3×10^8 rads	No Defects
A284	1×10^9 rads	No Defects

N/D = No Defect